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AUTHOR Cradler, John
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ABSTRACT

This executive summary of an in-depth analysis and evaluation of California's educational technology programs provides information on programs funded from 1984 to 1992 and provides guidelines for the evaluation of future state-funded educational technology programs and projects. Summaries of the findings for educational technology programs from 1984-89 include district-developed projects; Adoption/Expansion grants for technology access and use; Technology in the Curriculum (TIC) guides for selection of software and video; summer institutes for training educators to train others in integrating technology into the curriculum; California Instructional Video and Software Clearinghouses; video development projects; distribution of VCRs in 1985; and statewide licensing of instructional television (ITV) programs and their distribution. Programs authorized from 1989-92, which were the major emphasis of the study, are described under three headings: (1) Regional Support Services--California Technology Project and Instructional Television Agencies; (2) Resource Development--Level II Model Technology Schools, Level I Model Technology Schools, and Software Development Projects; and (3) School-Based Planning and Implementation--School-Based Educational Technology Grants. Recommendations for improving the quality of programs, equity of technology access, impact on students, management of resources, and accountability of the state educational programs conclude this report. (ALF)

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EXECUTIVE SUMMARY

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Comprehensive Study of Educational Technology Programs in California Authorized From 1984-92

John Cradler

Background

Since 1984 California has invested approximately $122 million in over 25 different educational technology programs and projects. The two state legislative mandates that authorized and guided the funding were the Educational Technology Local Assistance Program of 1983 (AB 803; Chapter 1133 Statutes of 1983) and the Farr-Morgan-Quackenbush Educational Technology Act of 1989 (AB 1470; Chapter 1334 Statutes of 1989). The California Department of Education (CDE), with advice from the Educational Technology Committee, provided statewide program management.

The programs include school-level projects, regional service agencies, and a variety of resource development and dissemination projects.From 1984 through 1989 over $80 million granted under AB 803 provided funding for: 1) School-based adoption/expansion grants to 79 percent of California schools, 2) regional Instructional Television (ITV) agencies to help educators use instructional video, 3) video and software clearinghouses, 4) consumer guides to assist in the selection of software and video, 5) software development partnership projects, 6) model technology demonstration and dissemination projects, 7) the California Technology Project, and 8) a variety of special projects.

In 1987, funding for AB 803 was cut by 50 percent, with a subsequent sunset of the legislation in 1989. AB 1470 reauthorized the Model Technology Schools (MTS Level I and II), the California Technology Project (CTP) and ITV, and software development projects. It also restructured the School-Based Grants Program, added Innovative Research and Development Grants, and established the California Planning Commission for Educational Technology to develop a state master plan for educational technology.

The Study

AB 1470 determined that future funding of educational technology must be guided by the results of research and careful statewide planning. It also required an independent evaluation of California's educational technology programs to 1) provide in-depth analysis and evaluation of all programs funded from 1984 to the present, and 2) provide guidelines and templates for the evaluation of future state-funded educational technology programs and projects. Far West Laboratory, subcontracting with American Institutes for Research, conducted the evaluation.

The evaluation design emphasized both formative assessment of program implementation and summative assessment of educational and program outcomes. Multiple measures were used to facilitate corroboration of findings including surveys, interviews, site visits, and reviews of existing reports. The study's findings and recommendations are intended to serve as a primary source of information for the Legislature, the California Planning Commission for Educational Technology, and the CDE in developing plans for educational technology.

Programs Authorized from 1984-89

The study of educational technology programs funded by AB 803 from 1984-89 concluded that:

- Of the variety of projects authorized to develop new and expanded uses of technology, some were completed successfully and others terminated due to the abrupt elimination of state funding.
- Eleven district-developed projects were disseminated statewide and reported to be successfully adapted or adopted by many schools receiving AB 803 Adoption/Expansion Grants.
- The Adoption/Expansion grants increased technology access and use, leveraged other resources to support educational technology, and stimulated teacher interest in the use of technology in the classroom.
- The Technology in the Curriculum (TIC) guides aided selection of exemplary software and video.
- In-depth summer institutes for training educators to train others in integrating technology into curriculum and instruction produced sustained effects with participants still reporting major benefits.
- The California Instructional Video and Software Clearinghouses are a

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valued resource for those who access their services, but the clearinghouses should be better coordinated with other resources such as the Subject Matter Projects and made more visible to educators.

- Video development projects such as the *On Location* California history series had potential but lacked the funding and project support resources required to produce high quality programs.
- The one-time distribution of VCRs in 1985 to all schools in California stimulated increased use of video in the classroom.
- The statewide licensing of ITV programs and their distribution by ITV agencies has provided a cost-effective means of increasing access to generally high-quality programs due to economies of scale.

Programs Authorized from 1989-92

A major emphasis of this study was the in-depth assessment and analysis of the six major programs and projects mandated and funded under the provisions of AB 1470. These programs fall into three general categories: 1) Regional Support Services; 2) Resource Development; and 3) School-Based Planning and Implementation. Following is a brief description and summary of the findings about each program:

1. Regional Support Services

A. California Technology Project The CTP was initiated in 1988 with AB 803 funding and continues to be funded under the provisions of AB 1470. The CTP's central office supports and provides quality control for 14 regional consortia, overseeing the development of their by-laws, budgets, governance, and programs. The consortia provide: staff development and assistance in integrating technology ; assistance in AB 1470 project development, implementation, and evaluation; coordination of resources for technology use; and facilitation of the use of the *Technology Resources In Education* (TRIE) information service on the California State University Telecommunication Network (CSUNet). The consortia are member-driven with services determined by local needs. Each serves many districts, often in more than one county.

- Consistently, the CTP consortia were reported to be:
  - a critical resource for planning, developing, and evaluating School-Based Educational Technology Projects.
  - often the only source of long-term staff development and local assistance for technology implementation.
  - capable of leveraging significant local funding and support resources with minimal state funding.
  - responsive to the local needs of those who have access to the services.
  - unable to serve some schools due to lack of funding and staff resources.
- CTP services were most effective when coordinated with other regional services offered by county offices of education, SB 1882 regional staff development agencies, and ITV Agencies.
- The CTP-maintained telecommunication system (TRIE) is accessed by a limited but increasing number of educators.
- Increased use of telecommunications can be facilitated by providing staff development, relevant and useful information on the system, and greater access to phones and modems in the classrooms.
- A user of CTP Services commented: *"The (CTP-sponsored) Technology Leadership Academies allowed our staff to be exposed to the latest technology and to see how the technology supports student learning... The CTP helped with our proposal and provided us with information; it's nice knowing they are there and available."*

B. Instructional Television Agencies Instructional video and related support services are provided by seven regional ITV agencies. The agencies work in conjunction with the CDE's Office of Educational Technology and media and technology staff in the counties and districts served. Financial support for ITV agencies is provided through AB 1470 with additional support from county offices of education, local districts, public television stations and, in some cases, membership fees. Instructional video programming is selected by committees representing schools and local educational agencies. The ITV agencies also play a major role in providing regional staff development programs on video resources.

- ITV agencies are able to generate significant revenue from membership and other sources but need continued state funding to ensure equity of access and sustained service.
- Teachers and media specialists generally indicated that information and staff development in the selection and use of instructional video is of high value.
- A great deal of regional variation exists in the level and type of service provided by ITV agencies.
- Increased planning and coordination of services is needed between ITV agencies, county media services, and CTP consortia.
- A county media director said: *"Our ITV agency has been an invaluable resource in assisting us with our*

curriculum improvement efforts. They have provided workshops which are highly rated by our teachers at all levels. They have developed support materials correlating ITV programming with our curriculum and have broadened the range of curriculum enhancements available to our students."

2. *Resource Development*

A. Level II Model Technology Schools Projects The Level II Model Technology Schools (MTS) program was initiated in 1987 when the CDE awarded AB 803 grants to 10 school districts to develop and validate projects that would integrate technology within a single curriculum area at specific grade levels at a school site. Funding for six project sites was continued under AB 1470 to package and disseminate the programs throughout the state so that other schools could adopt or adapt the models.

- Level II MTS Projects facilitated school-based program planning by providing field-tested practices and products for adoption/ adaptation.
- Lack of consistent funding assurances impeded planning and effectiveness.
- Collaboration with Subject Matter Professional Development Projects facilitated dissemination of effective practices.
- Most effective and frequent adopters of Level II MTS Projects were School-Based Grant recipients. Over 170 schools reported adopting or adapting the projects.
- The formation of a coalition of the six Level II MTS Projects greatly facilitated dissemination through the sharing of resources.
- The projects consistently reported gains in student motivation and academic performance.
- The development of field-tested technology-based practices and models saved money.
- An adopter of a Level II MTS Project commented: *"We had an in-service from the Level II Project right after we found out we were being funded. When we saw all the equipment and all the possibilities, we knew we wanted it! Our teachers were sold with the first in-service."*

B. Level I Model Technology Schools California's Level I Model Technology Schools Projects were initially funded in 1987 by AB 803 to develop and demonstrate successful practices and products to other schools and districts throughout the state. Each of the six projects includes a research component to determine the impact and benefits of technology applications on teaching and learning. Expected outcomes of these projects included validated models for technology planning, implementation, and assessment that can be adopted or adapted by other schools. The six projects vary greatly and range from networked labs to individualized computer applications. They provide a wide range of options for potential adoption of their practices and products.

- Planning and implementation varied among the six projects. Three focused on specific student and teacher-centered planning and implementation approaches, the others on district-level planning for site implementation.
- Model sites showed very significant changes in instructional practices. Most indicated that teaching became less directive, more individualized to student needs, more student-centered, and more likely to emphasize problem solving.
- Technology generally served as a vehicle for facilitating the desired changes in teaching and learning found in the study of Level I MTS projects.
- All sites need additional guidance and support for packaging, disseminating, and marketing their products and practices.
- Cost per pupil for project development and implementation ranged from $45 to $600.
- Though data sources varied from performance test scores to teacher perceptions, all Level I MTS sites reported substantial gains in student academic performance resulting from the projects.
- Most Level I MTS Projects were able to attract significant levels of business support such as donations and loans of equipment and software and in-kind human resource support.
- At the time of this study, dissemination of Level I MTS products and practices was underway but not equally emphasized among projects. On site visitations and conference presentations were the common dissemination methods.
- Expectations and standards for project development, implementation, evaluation, and dissemination were not consistent or clear to most project staff.
- A visitor to an MTS site commented: *"I noticed smooth blending of aspects of the curriculum with technology…Nice to see funds put to wise and efficient use…I really liked how a few of the teachers stopped to involve us in the lessons with the kids."*

C. Software Development Projects Between 1987 and 1991, seven software development partnership projects were funded by the CDE to develop quality software and video programs to support the California Curriculum Frameworks. These grants provided seed money to encourage publishers to invest capital

in return for guidance and support from the CDE. Four of these projects, representing 94% of the funding, were completed.

- Successful projects contributed to the production of technology-based materials that clearly support and enhance the California Curriculum Frameworks while using the latest technology.
- Support from the CDE was limited by lack of funding and resources.
- Successful software development projects leveraged approximately 135 percent of the level of funding provided by the state.
- Successful projects produced royalties to the state for out-of-state sales and provided discounts on training to schools within California.
- Particular projects served as models for software development. These tended to be highly interactive and allowed for teachers and students to explore and manipulate information in a variety of ways.
- Independent evaluations of the impact of the products and the marketing procedures were not consistently conducted across the software development projects.
- Student interest, motivation and critical thinking skills were reported to have increased in field tests and surveys. Conclusive data on student performance had not been collected at the time of this study.
- One of the software development products was found to be the most popular video laserdisc purchased for classroom use by School-Based Grant recipients.
- A teacher describing student use of Geography Television (GTV) said: *"One student had missed the instruction the others received earlier in the year. He asked to borrow the GTV manuals and taught himself. His presentation was the best in the class."*

3. School-Based Planning and Implementation

A. School-Based Educational Technology Grants School-Based Educational Technology Grants are awarded to schools on a competitive basis to: 1) develop new technology uses, 2) expand existing technology-based programs, and/or 3) adopt or adapt existing model technology programs. Since 1989, approximately 850 such grants have been awarded to schools in California. Demand for this program is very high; there were 1,700 applicants in the first two years and 1,100 in the third. Approximately 30 percent of applicants received grants.

- With assistance from the CTP, CDE, ITV agencies and county offices of education, the grant application process and guidelines greatly facilitated inclusion of technology into local instructional planning and school-site plans.
- Over 70 percent of the projects emphasized English-language arts.
- Close to one-third of the School-Based Grant recipients adopted Level II MTS projects.
- Those schools adopting Level I and II MTS products and practices found it much easier to implement their projects.
- The CTP was a major source of assistance to School-Based Grant projects.
- Almost all project staff reported that at least some aspects of the projects will continue with local funding and support after their AB 1470 funding is expended.
- When schools included site-based technology-use planning into their existing school plans, use of School Improvement Program (SIP) funding for technology was stimulated.
- Project staff, teachers and students consistently reported significant increases in student academic performance and motivation.
- Though dissemination was not the focus of these projects, the study identified promising practices and products with potential for application at other sites.
- Many teachers reported that the lowest achieving students benefited the most from the introduction of technology.
- The School-Based Grants' emphasis on planning made it much easier for schools to integrate technology into instructional programs.
- Allocation of grant resources for the first year of the program was equitable in terms of student ethnic distribution, school size and location.
- On average, school-based projects spent nearly two-thirds of their funding for hardware and 14 percent for software. The remaining funds went to staff development, evaluation, planning, and print materials.
- One project director commented: *"AB 1470 funding was indispensable. Without it the project could not have been implemented...This project led to additional district funding for equipment and resources...The Technology Use Planning process made implementation easy."*

Conclusions and Recommendations

This study has helped identify important and effective technology practices, products, and resources that have evolved from state-funded educational technology programs and projects since 1984. Cumulatively, these programs and projects have resulted in much that should be considered for continuation or modification in the future. The external

pressure to reform, or "break the mold" should not give rise to the arbitrary decision to abandon and discontinue the successful programs and practices that have been developed. Restructuring efforts should look at better and more effective ways to use and make available the promising practices, products, and resources made possible by the implementation of programs and projects authorized by AB 803 and AB 1470. Future programs should be flexible enough to allow for change and development using new and emerging technologies.

Many of the recommendations for improving the quality of programs, equity of technology access, impact on students, management of resources, and accountability of the state educational programs will require a significant increase in state funding. Since 1987, California's educational technology programs operate with less than half the amount of state funding received earlier in the decade and without the support of prior programs such as the Teacher Education and Computing Centers. Additionally, funding levels for educational technology are presently much less for California than it is for many states.

This study clearly shows that the following areas of emphasis should be considered in developing and implementing new educational technology initiatives and programs:

- Equity of access to technology-based resources for all students and educators.
- Technology-use planning at the site level.
- Professional development that supports teacher needs and curriculum integration.
- Integration of technology into curriculum and instruction.
- Accountability to show the benefits and effects of technology-based programs and services.
- Coordination of resources for technology use among and within educational agencies.
- Research, development, and dissemination of projects to help education keep pace with business and industry in using the new technologies.
- Improved technology-facilitated information sharing among all educators.
- Business and community partnerships that improve education.
- Increased access by educators to information about educational technology resources.

The study provides specific recommendations for improving regional services, resource development, and technology access. These are summarized below.

A. State Level Activities

1. Establish, implement, and maintain a state level educational technology plan.
2. Provide sufficient and sustained funding for educational technology programs and projects.
3. Provide state standards for program development, implementation, and evaluation.
4. Provide a coordinated and user-friendly statewide telecommunications and distance learning system.
5. Adopt State Board of Education-approved standards for integrating technology use into the state curriculum frameworks.
6. Incorporate educational technology applications into established assessment systems including Program Quality Review and the California Assessment Program.
7. Establish a process or structure to facilitate the articulation of educational technology programs between K-12 and post-secondary education.
8. Provide coordination among state projects and programs to expand incorporation of technology into curriculum and instruction.
9. Provide standards and support for designing new schools and retrofitting existing school sites to accommodate technology.

B. Resource Development and Dissemination

1. Continue funding Research and Development Projects to identify effective uses of new technologies in education.
2. Provide incentives, including funding, for industry to develop needed technology-based materials.
3. Use video and voice telecommunications to deliver instruction and staff development.
4. Disseminate the effective practices and products of the Model Technology Schools as well as exemplary practices and products produced from other sources.
5. Establish a statewide clearinghouse to include information about exemplary educational technology programs, products, research, and support resources as well as exemplary software and video programs.

C. Regional Services

1. Develop and implement a plan to increase efficiency, coordination, and delivery of regional assistance to support technology use.
2. Increase regional staff development opportunities, especially in rural areas of the state.

3. Ensure that the CTP regions are adequately supported and organized to provide equity of services based on locally determined needs.
4. Establish incentives to stimulate increased coordination of services between and among service agencies.
5. Where appropriate, expand the role of ITV agencies to include video teleconferencing, multimedia, and other video technologies.
6. Ensure that follow-up and assessment of the impact of services by regional agencies and consortia is provided whenever possible.

D. School and District Level Resources

1. Continue to support School-Based Educational Technology Grants with emphasis on planning, staff development, curriculum integration, and evaluation.
2. Require School-Based Grant projects to use 15 percent of their grants for staff development and 15 percent for planning and implementation.
3. Increase access of school level project resources to students with special and alternative education needs.
4. Establish more effective business partnerships and local support mechanisms.
5. Expand the options for group purchases of technology-based resources.
6. Provide incentives and guidelines for schools to incorporate and fund technology within existing local programs.
7. Continue distribution of funds to schools on a competitive basis to promote local planning and commitment to effective technology use.

To order copies of the summary report and analysis, call John Cradler, (415) 565-3018.

Executive Summary

Project Director

John Cradler

Project Consultants

James S. Eckenrod
Lynda Greene
Vicki Lambert

American Institutes for Research Staff
Principal Evaluator

Tom B. Parrish

Researchers

Jane Schubert
Ixtlac Duenas

Data Analysis and Desktop Publishing

Dan Cradler
Kerrie Evans
Paul Smicker

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FarWest LABORATORY

730 Harrison Street
San Francisco, CA 94107
(415) 565-3000

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